Chapter 5

Critical Task Capability

Introduction

Emergency events occur at all hours, all days, and under all conditions. Emergencies are like lightning strikes – they occur anytime, anywhere. The fire service's response to these unpredictable conditions has been to develop a methodology for being prepared to respond in a timely fashion when they occur. The operative word is *timely*.

The ability of a fire & EMS department to comprise an effective response force when confronted with the need to perform required tasks on a fire or EMS incident scene is its ability to provide adequate resources to mitigate each event. LF&EMS believes that time, which equates to speed and positive performance in performing fire ground tasks, is the benchmark for a response force to be successful. To meet the challenges of time and on-scene expectations, benchmarks of operational preparedness guide LF&EMS.

The rapid and effective performance of highly coordinated assigned tasks is the hallmark of a successful emergency response force. Time and on-scene performance expectations are the target indicators established for measuring the operational elements (individuals, crews, and work units) that comprise LF&EMS response-ready resources.

NFPA 1710

National Fire Protection Association (NFPA) [1] 1710 is the Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments. This standard outlines an organized approach to defining levels of service, deployment capabilities, and staffing for "substantially" career fire departments. Specifically NFPA 1710 provides standard definitions for fire apparatus, personnel assigned, procedural guidelines within which they operate, and staffing levels needed to accomplish specific tasks on arrival at an incident.

[1] The National Fire Protection Association develops and publishes fire and life safety consensus standards, some of which address fire department organization, procedures, and activities.

NFPA 1710 states that fire departments shall establish a performance objective of not less than 90% for each of the following response time objectives:

- One minute (60 seconds) for turnout time[2].
- Four minutes (240 seconds) or less for the arrival of the first-arriving engine company at a fire suppression incident and/or eight minutes (480 seconds) or less for the arrival of a full alarm assignment at a fire suppression incident (including one individual for incident command outside of the hazard area).
- Four minutes (240 seconds) or less for the arrival of a unit with first responder, or higher level of capability at an emergency medical incident.
- Eight minutes (480 seconds) or less for the arrival of an advanced life support unit at an emergency medical incident, where this service is provided by the fire department.

NFPA 1710 outlines staffing, deployment, and response time standards for career fire departments. While LF&EMS has not adopted the response times in NFPA 1710 as a local standard, it will regularly measure its response time performance against those times. LF&EMS also utilizes standards established by the American Heart Association (AHA) as related to emergency medical incidents.

LF&EMS has adopted the response time standards stated in this section. These standards are based on the risk analysis of the service area, the critical task analysis conducted by the department and the historical performance of the department. These are to be considered local standards—a reasonable response to the level of risk in the community. They provide measures of the current levels of service the department provides to its service area. In addition, we have identified areas for improvement and have set future service level improvement goals that are presented later in this document.

In the Fall of 2004, the Lynchburg Fire Fighters Association (the local affiliate of the International Association of Fire Fighters), in cooperation with LF&EMS' administration, had a geographic information system fire suppression and EMS

[2] Turnout time is the interval between the activation of station and/or company alerting devices (plus the delivery of specific dispatch information to emergency personnel), and the time when the responding crew(s) notifies the dispatch center that the company is en route.

capabilities analysis performed by the IAFF. The study utilized data provided by LF&EMS to the IAFF.

The study examined predicted response times and geographic coverage areas for LF&EMS units deployed from current fire stations. The study analyzed the department's, then current, response and staffing capabilities in comparison with NFPA 1710. While the analysis provided favorable remarks on response coverage, it was noted that the individual staffing levels on engine, truck and rescue companies do not meet the NFPA 1710 recommendation. Although the individual company staffing levels do not meet the NFPA 1710 standard for individual staffing levels on engine, truck and rescue companies, LF&EMS *is* able to assemble an effective response force on the scene within the recommended response time objectives as prescribed in the NFPA standard The response capability maps are included in Chapter 6, *Service Level Objectives.*.

Time Points and Intervals – The Cascade of Events

Over the years, response time data has been analyzed by the fire service industry using a variety of methods. Careful definition of terminology is essential to any conversation about response standards. It becomes even more critical when an organization attempts to benchmark its performance against other providers.[3] In order to standardize the terminology used by departments throughout the United States and Canada, CFAI has developed the following set of definitions to be used for describing the individually recognized components of response time. These elements can be appropriately viewed as an interrelated cascading sequence of events, consisting of a series of points in time separated by intervals. LF&EMS has adopted the following definitions, which are consistent with the CFAI.

[3] Commission on Fire Accreditation International, Inc., Standard of Response Cover Manual, Chapter 5, page 1. 2003.

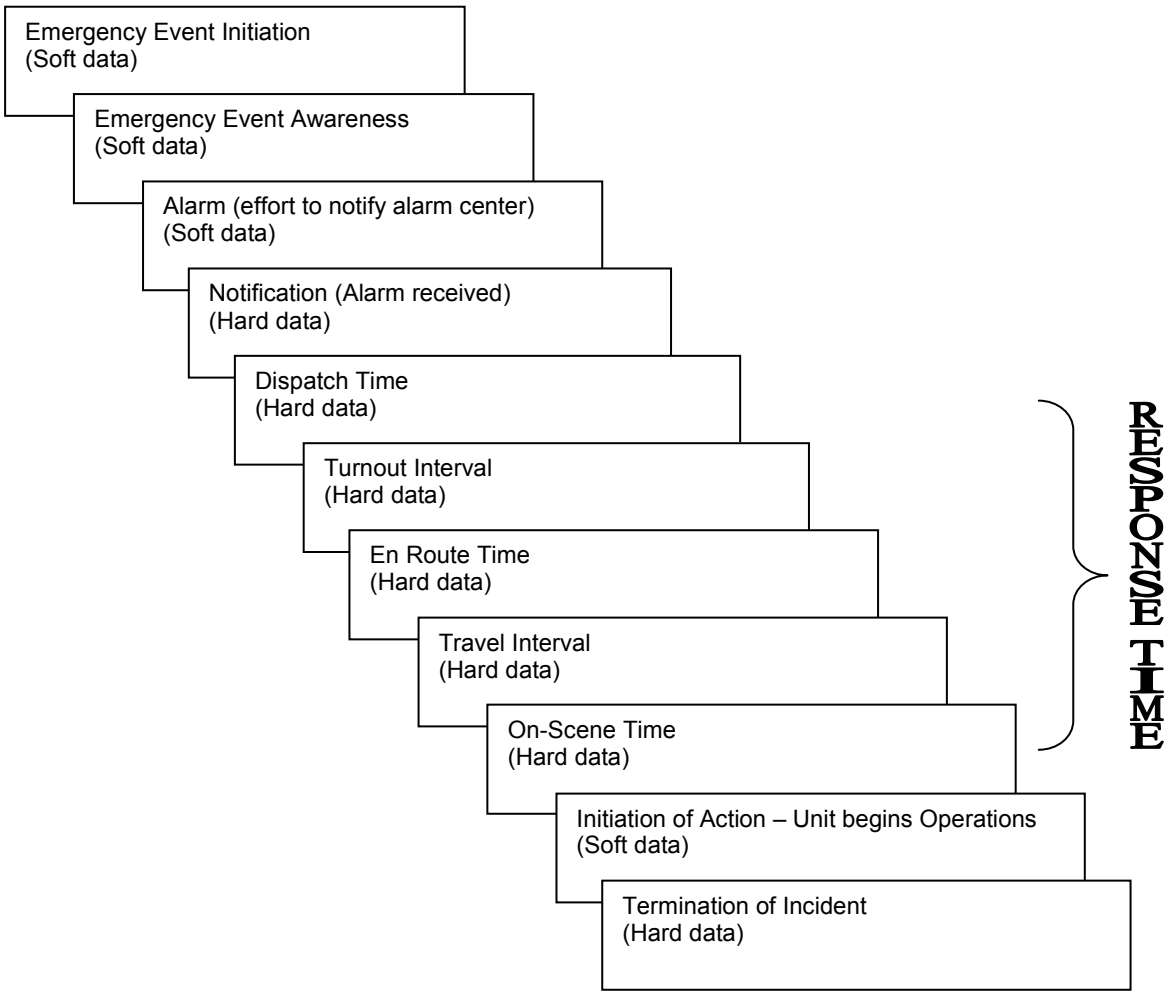


Figure 5.1 **Cascade of Events**

Event Initiation – the point at which events occur that may ultimately result in an activation of the emergency response system. Precipitating events can occur seconds, minutes, hours, or even days before a point of awareness is reached. It is rarely possible to quantify the point at which event initiation occurs. An example is the patient who ignores chest discomfort for days until it reaches a critical point at which he/she makes the decision to seek assistance.

Emergency Event Awareness – the point at which an individual or technological sentinel (e.g., smoke or heat detector) becomes aware that conditions exist requiring an activation of the emergency response system. This is considered the point of awareness.

Alarm – the point at which awareness triggers an effort to notify the emergency response system. An example of this time is the transmittal of a local or central alarm to a designated public safety answering point (PSAP). Again, it is difficult to determine the time interval during which this process occurs with any degree of reliability.

Notification – the point at which an alarm is received by the PSAP. This transmittal may take the form of an electronic or mechanical notification process to the point at which a call is received and answered within the PSAP.

> **Call Processing Time** – the interval between the first ring of the 9-1-1 telephone at the dispatch center and the time the dispatcher activates station, company, and/or individual alerting devices. This interval can also be broken down into two additional sub-intervals: *"call-taker interval,"* which is the time from the first ring of the 9-1-1 telephone until the call-taker subsequently transfers the call information to the dispatcher; and *"dispatcher interval,"* which is the interval from the time when the call-taker transfers the call to the dispatcher until the dispatcher activates all applicable alerting devices for responders.

Dispatch Time – The time when the dispatcher, having selected appropriate units for response, initiates the notification of response units.

> **Turnout Time** – the interval between the activation of station and/or company alerting devices (plus the delivery of specific dispatch information to emergency personnel), and the time when the responding crew(s) notifies the dispatch center that the company is en route. During the turnout interval, crews immediately cease all other activities, don appropriate protective clothing, determine the location of the call, board and start the appropriate response vehicle. The en route notification to dispatch is typically made when all personnel are aboard the apparatus, and the vehicle is traveling toward the call location. The established benchmark for an acceptable turnout interval is 60 seconds.

En Route Time– the point at which the responding unit signals the dispatch center that they are responding to the call for service or traveling toward the hospital or other appropriate receiving facility. On calls in which a patient is

transported, there are two en route times (to the call and then to the medical receiving facility).

> **Travel Time** – the interval that begins at the termination of the en route notification and ends when the responding unit notifies the dispatcher that it has arrived on scene.

Arrival (On-scene) Time – the point at which the first responding unit arrives on scene or the transport unit arrives at the receiving facility. Arrival is determined by actual physical arrival in front of the address or at the address of the emergency as displayed by the CAD.

Initiation of Action – the point at which operations to mitigate the event begin. This may include size-up, resource deployment, etc.

Termination of Incident – the point at which the designated incident commander notifies LynCom[4] that the assignment has been completed and the units assigned are either out of service, or are available to respond to other requests for service.

Response Time – Includes the elements of responding to an incident that are directly under the control of the LF&EMS (i.e., Turnout Time plus Travel Time)

Total Reflex Time (Customer Time) – This measure is an indicator of the performance of the emergency service system, whether or not the fire department directly controls those elements. This interval adds the call processing interval to the response time interval. This is also referred to as the "customer time," because this is the total amount of time the customer is waiting for the emergency responders to arrive at the scene.

Time Methodology Description

Many fire agencies will publish statistics at the end of the year that read something like this: *"The Lynchburg Fire & EMS Department responded to 13,000 calls for service in 2004. The average response time was five minutes."*

[4] LynCom is the PSAP for the fire department. It is a centralized PSAP for the fire and police departments, but is a division of the police department.

There are two problems with this statement. One is simply the number of incidents and the other is the amount of time as an average. It does not reveal what the types of events were, such as fires versus medical, or emergency versus non-emergency. Nor does it mention what were the longest or shortest responses. To get an average one simply adds the total amount of time intervals and divides by the total number of calls. However, if there are a couple of unusually long response times resulting from abnormal circumstances or unusually short response times (like 0 minutes for a *"still alarm"* when a customer comes directly to the fire station instead of calling 911), this will skew the average. The results could make it appear as though the department frequently has long response times rather than having had a couple of abnormally long response times.

Two fire departments can report the same "average" response time, yet the two communities can receive vastly different services. For example, *City A*, with a 4-minute average response time, could have response times falling somewhere between 3 and 5 minutes. *City B*, with the same 4-minute average response time, could have a few calls with a response time of less than one minute and some calls with a response time of 10 minutes or longer. Thus, the use of "averages" has the effect of concealing, rather than clearly demonstrating, true response performance for an agency.

It is important to be clear about what we are actually measuring. The definition for measuring response times must include specific types and methods of responses to the various types of calls for service that are provided. These types and methods should be grouped together in similar types of calls or incident categories. While this can create more work, the results will be a true representation of the service level that is being provided to the community. An effort has been made to make sure that the evaluation of performance is not being misrepresented by measuring one thing and evaluating another.

There are indeed two basic components to a performance standard. The first is the measurable task, e.g., response time. The second part is the level of performance. This is normally stated in terms of an average or a percentage (fractile) of the amount of such tasks that fall at or below the desired level, e.g., 80%.

Using this evaluation methodology, an organization can clearly articulate its performance standards and goals in a manner that is easily understood. For

example, the statement, *"The fire apparatus will leave the station within 60 seconds of alarm activation, at least 90% of the time,"* is a performance goal that can clearly be understood by everyone.

Observations on Time Components

In the fire service, it has long been recognized that notification is an important element of effective fire protection. Stated simply, if a fire starts and is allowed to grow to the point where it achieves a flashover[5] state within a structure, people die and property is destroyed. In any case, the problem of suppressing fire increases significantly with each second that a fire burns undetected.

Today there is a great deal of technology such as smoke alarms to perform the actual detection of smoke or any form of ignition. But smoke alarms are not designed to warn someone outside of the structure; they only alert someone who is inside of the building. The fire must produce products of combustion before the smoke alarm operates. And when it does, if the person in that room is not awakened or doesn't properly respond, the fire department may not know that a fire is in progress.

For the purposes of this document, notification includes detection, alarm and contact. Detection is the technology able to sense the products of combustion, including smoke, heat, flame or fire gases. Detection can include human intervention, such as fire alarm "pull stations." Sprinkler systems also function to achieve that type of communication. Any assessment of community risk must recognize the role of all available technology in quickly containing and minimizing. Notification is an actual linkage between the event that is in progress and the emergency response capacity of the community. In other words someone must call the fire department.

Unfortunately, some people do not realize that without detection, alarm, and notification, the emergency response system is essentially deaf, blind and silent. There is a tendency to believe that when a fire starts, the fire department will be there four minutes later. That's not true. And moreover it's misleading when the travel time is set as the only performance measurement for the fire department.

[5] Flashover is an event that occurs when all the contents of a compartment reach their respective ignition temperatures in a very short period of time, usually seconds. This results in simultaneous ignition of all surface fuels and fire gases within the compartment.

To the contrary, when a fire starts there may have been an extended period of time that it remained in a low-challenge state and no one detected it. Moreover, it is conceivable that a fire will go to higher and higher levels of assault on a building without ever being detected. This is often the result if there are no detection devices. Therefore, when a fire department arrives at the scene of a fully involved building where there were no detectors, no alarms and no notification, the five-minute travel time is somewhat irrelevant. Further, the primary focus of an effective fire protection program should be on reducing the point of time between ignition and detection. Then, assuming that detection could be compressed as closely as possible, the next fire protection principle should be to create a state of alarm as quickly as possible. And the third principle is that notification should be linked with the fire department reporting system to minimize the period of time taken to give the response unit the location of the in progress event.

Within the concept of fire behavior it is a well-known fact that almost all fires go through certain stages of development in a fairly logical sequence. The low-challenge, smoldering fire compared to the high-challenge pre-flashover phenomenon demonstrates the range of the problem. Once a fire starts, it will grow in relationship to the special configuration of the fuel and the building as well as interacting with the oxygen level and the distribution of products of combustion. Therefore, putting fire stations in a community and promising the public that the fire fighters will be there within a specific travel time should always be qualified by the following statement: "The fire department will respond to the scene of emergencies within 4-minute travel time *after it has been notified* and has been able to transmit the alarm to its respective fire stations." This is a statement of reality. One of the best ways the fire service can improve the quality of life in a community is to compress the notification time to an absolute minimum.

Travel time is the one thing most people can understand with ease. It is the time period from wheels starting to wheels stopping in front of the emergency. Again, this is a simple concept, but it can be complicated by many factors.

The discussion of travel time requires a look at community traffic patterns and the possible use of traffic calming devices. Most discussion about the idea of traffic calming devices has focused on how to get the traffic out of the fire department's

way so that it could go from the location where it is dispatched to the location of the emergency in the shortest amount of time. This has focused primarily of "code 3" responses[6] and traffic signal pre-emption devices. However, traffic patterns at different times of the day can affect response times. Traffic calming devices that are installed to slow down traffic patterns can also delay fire apparatus. Devices such as chicanes, speed bumps, one-way streets and even signal patterns can have adverse impacts. More so, the effects on response times are more about what is happening with traffic circulation. As communities have grown and become more dense, the infrastructure to support the mass movement of large numbers of vehicles has not always kept pace. This is a very important consideration for the Department of Planning and Development as new development occurs throughout the city.

The significance of all of this is the affect on response patterns and actual response performance. If our credibility in handling emergencies is partially dependent on travel time, then we must have a role in planning the traffic circulation system. Once a fire company has been alerted there is an emergency in progress, it must go from the point of dispatch to the point of the incident as rapidly as possible.

Exception Reporting

Several factors that are beyond the department's direct control may adversely affect emergency response times. When calculating response time performance, LF&EMS was unable to remove calls that appear, after review, to be exceptions or outliers within the data curve. While some anomalies were detected, there were others that could not be identified with certainty based on current mechanisms and procedures in incident reporting. Examples can include:

- Adverse weather conditions (e.g., snow, ice, floods).
- Calls initiated as "Code 3" but unit slowed to non-emergent speed while en route.
- Unexpected delays (trains, construction, extreme traffic conditions).
- Calls clearly miscoded by dispatch where this results in spurious data.

To even more accurately reflect true response time performance, LF&EMS should make attempts to improve reporting of exceptions during response.

[6] Code 3 response is a mode of emergency vehicle operation where the vehicle utilizes lights and sirens while traveling.

Response Performance Analysis

To avoid the balancing effects of response time averages, LF&EMS evaluates response times using percentile analysis, which offers the most meaningful and accurate measure of performance. In the table below, the comparison between the mean, the 80th percentile and 90th percentile[7] is significant. While no single measure tells the entire story, LF&EMS has chosen to use fractile measures in its performance standards because they represent the large majority of tasks completed in specific timeframes and give a good indication of the level of service our community can expect to receive.

Table 5.1 **Current Response Times – All Emergency Incidents**

Element	Adopted Standard	Mean	80th Percentile	90th Percentile
Alarm Rec'd Period	1:00	0:43	1:07	1:18
Turnout Time	1:00	0:43	1:05	1:17
Travel Time (1st arriving company)	4:00	2:36	3:59	4:42
Total Reflex Time (Customer Interval)	6:00	4:08	6:11	7:17

This document is intended to be a "living" document; fluid to changes in available data, scene technology, risk or type of risk. The integrated performance objectives presented later in this document may be adjusted based on performance in future years. Upon adoption of this document, LF&EMS' response time goals (Total Reflex Times) will be those integrated performance objectives.

The Relationship Between Fire Behavior and Response Time

Firefighters meet a wide variety of conditions at each fire. Some fires will be at early stages and others may already have spread throughout an entire structure. This variation in condition complicates attempts to compare fire department capability. A common reference point must be used so that the comparisons are made under equal circumstances.

When conducting fire station location and apparatus staffing studies, the flashover point – *the most significant threat to life and property* – is the event that the

[7] The 80th and 90th percentile refers to the percentage of all calls type(s) received in a given time period.

service intends to prevent from occurring. From an emergency medical perspective, a six-minute time frame is used as a means of service level measurement because brain damage is very likely in cardiac arrest patients after six minutes without oxygen flow to the brain.

Dynamics of Fire Growth

The dynamics of fire growth are directly related to various configurations of fire station location, built-in fire protection, and company staffing patterns. The fire suppression tasks required at a typical fire scene vary widely depending upon risk level. In order to save lives and limit property damage, fire companies must arrive at the right time with adequate resources to do the job. One of the most difficult challenges facing fire managers is matching the arrival of resources with a specific point of fire growth.

The answer to controlling variations in fire dynamics lies in finding a common reference point – one reference point that is common to all fires, regardless of the risk level of the structure, contents of the structure, or the amount of time the fire has burned. All fires go through the same stages of growth regardless of the speed of growth or length of burn time. The most significant of these stages is flashover because it marks a critical change in conditions. It is a big turning point in fire conditions that escalates the challenge to a department's resources. It is desirable to have fire companies on-scene with hose lines deployed prior to this time.

So why is flashover such a significant fire event and why is preventing this stage of fire behavior appropriate for evaluating fire department capability? Fire department performance capability is easy to measure, but at the same time difficult to interpret. Specific performances are not difficult to record. Travel time data will show how long it will take to get fire companies to a fire at point "X". Likewise, fireground tasks such as operating an attack line or raising ladders are easy to measure. But these measurements alone do not indicate what can be accomplished in the time frames recorded. More knowledge is needed before concluding what the fire companies are capable of when they get to a fire.

Two significant factors that must be known are:

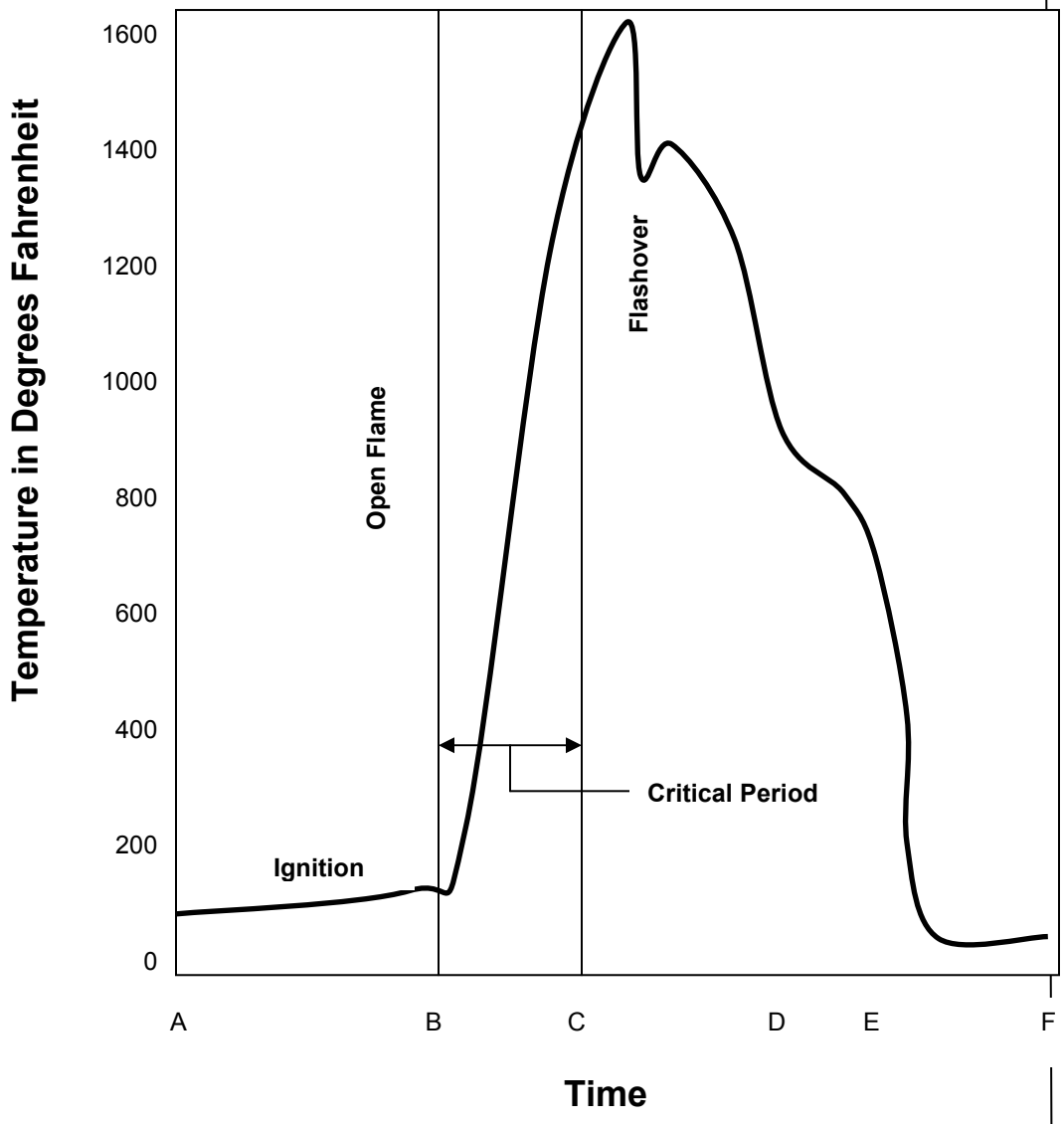
- The threat of the fire – Is it small and isolated from other combustible material? Are occupants trapped by smoke or flames? How fast is it growing?

- The number of fire suppression tasks involved – A small fire with little smoke might require only a few firefighters to extinguish it and remove smoke from the building. A larger fire will require a greater number of firefighters, and a fire where lives are threatened will require still greater numbers of firefighters.

To make valid comparisons of fire department capability, the comparisons must encompass the variation in fire threat and fireground task factors. The dynamics of fire growth interrelate with various configurations of fire station location, built-in fire protection and staffing patterns as a result of different scenarios of fire growth. The fire suppression tasks that are required at a typical fire scene vary a great deal depending upon risk level. Fire companies must arrive at the right time, with adequate resources to do the job in order to save lives and limit property damage.

Flashover normally occurs from four to ten minutes after free burning (incipient stage of fire growth) begins. The time to flashover is a function of time and temperature. Fire growth occurs exponentially, doubling every second that free burning is allowed. This growth can be plotted on what is known as the time temperature curve as illustrated in the following graphic:

Figure 5.2 **Flashover: Time – Temperature Relationship**



When flashover occurs, everything in the room instantly erupts into flames. This eruption generates a tremendous amount of heat, smoke, and pressure resulting in enough force to extend the fire beyond the room of origin through doors and windows, or breaches in walls. The combustion process speeds up incredibly because it has an even greater amount of heat to transfer to unburned objects through convection, conduction, and radiation.

Flashover is a critical stage of fire growth for two reasons. First, the chance of saving lives drops dramatically because no living thing in the room of origin will

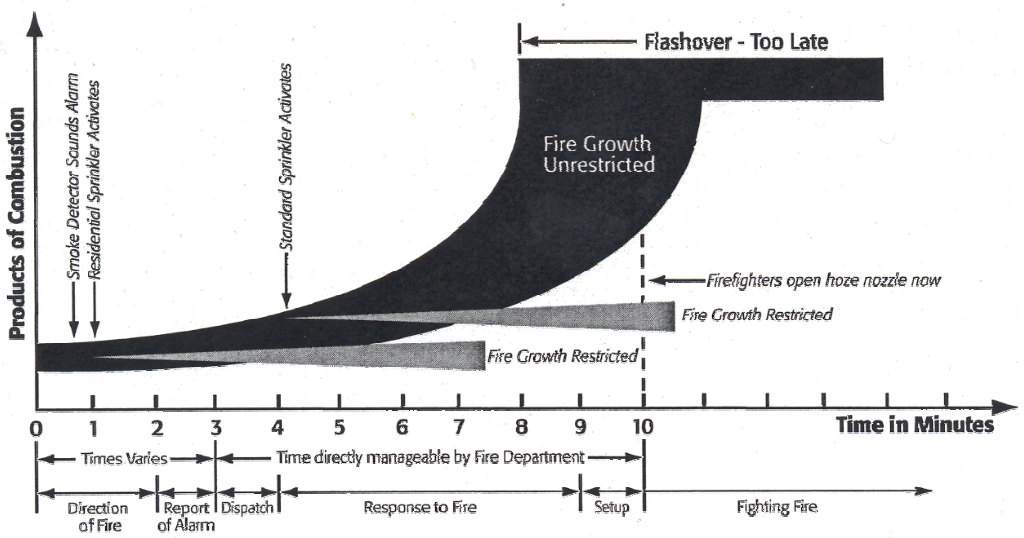
survive flashover. Second, flashover creates a quantum jump in the rate of combustion, and a significantly greater amount of water and resources are needed to reduce the burning material below its ignition temperature. Once a fire has reached flashover, it is too late to save a victim from the room of origin, and a greater amount of resources, equipment, and personnel are required to handle the larger hose streams needed to extinguish the fire. A post-flashover fire will burn hotter and move significantly faster. This compounds search and rescue problems in the remainder of the structure.

Figure 5.3

The Significance of Flashover	
Pre-Flashover: Limited to one room Requires smaller attack lines Search and rescue is easier Initial assignment can handle	**Post-Flashover:** May spread beyond one room Requires more and larger attack lines Compounds search and rescue Requires additional companies

Looking at the diagram below, clearly the stage of a fire affects staffing and equipment needs. Both of these needs can be reasonably predicted for different risk levels and fire stages. The ability to correlate staffing and equipment needs with fires according to their stage of growth became the basis for a response coverage study by a fire department.

Figure 5.4 **Time Versus Products of Combustion**



It is unreasonable to expect a fire department to reach all fires before flashover occurs. As for the reasonable number of fires that an effective response force should reach before flashover, the following point must be kept in mind. Given that some fires will reach flashover before the fire department can respond – either because the materials involved are very volatile, because the fire was accelerated with flammable liquids, or because the fire went unreported – it is unreasonable to expect the fire department can save every life or eliminate all significant property loss.

EMS Time Benchmarks and Expectations

There is little doubt strict cost-benefit analysis would dictate most cardiac arrest resuscitation efforts be abandoned because of the inexorable decline in survivability as time passes. However, this strategy would be difficult to defend morally, given public expectations and the value that society places on each and every life. Nevertheless, the cost of deploying resources capable of meeting clinical response time guidelines is significant. However, the hidden risk of not deploying resources to treat cardiac arrest effectively in the field would likely include litigation and political unrest.

Like fire suppression performance goals, EMS response goals are based on a critical point in time. This point is brain death, which is when there is absence of spontaneous movement, spontaneous respiration, and of all brainstem reflexes.

The American Heart Association (AHA) has determined that the brain begins to die in four to six minutes without oxygen; damage is irreversible after ten minutes. Interventions include cardiopulmonary resuscitation (CPR) and electrical defibrillation. According to the AHA, defibrillation is the single most important factor affecting survival of the cardiac patient. Additionally, the AHA has emphasized for many years that the earlier CPR is initiated, the better the patient's chance of survival. Early CPR and defibrillation within the first three to five minutes after collapse, plus early advanced care, can result in high (greater than 50%) long- term survival rates. The relation of time to two key resuscitation efforts, CPR and defibrillation, is illustrated in the following table:

Figure 5.5 **Cardiac Arrest Survival Probability**

Collapse to CPR	Collapse to Defibrillation	Probability of Survival
$\leq$ 5 minutes	$\leq$ 10 minutes	37%
$\geq$ 5 minutes	$\geq$ 10 minutes	7%
> 5 minutes	> 10 minutes	20%
< 5 minutes	< 10 minutes	0%

Response goals for EMS calls should reflect the urgency for care as recommended by the AHA. Setting goals and objectives that allow EMS patients to have access to CPR and defibrillation as quickly as possible will greatly improve the chances of survival. LF&EMS has begun a public access defibrillation (PAD) program in an effort to further enhance the chances of survival of the cardiac arrest patient.

Prior and current fire deployment time measures essentially stop when the unit arrives on the scene. However, just as fire suppression efforts require set-up time, EMS patients are not treated until the EMT or paramedic gets to the patient's side. This could require a walk into a garden apartment complex, or an elevator ride in a high rise building. There is no current consensus on the issue of including this time segment into the total reflex time. For the purposes of this standard of response cover document, the EMS total reflex time is determined when the unit arrives at the scene. Further study will take place in the future to determine the need for adjusting reflex time to reflect the arrival of EMS personnel at the patient's side.

Additionally, structured caller interrogation should be utilized to prioritize medical incidents based on the type of medical complaint from the patient. EMS response time standards should be based on the medical urgency of the patient. Application of this methodology is consistent with the establishment of different response time standards for different risk categories. However, LynCom does not train dispatchers in emergency medical dispatching and often too many resources are dispatched for patients with complaints that could have resulted in minimal resources dispatched had there been further interrogation of the caller.

On-Scene Operations

The fire scene is unpredictable in many ways. While it is possible to anticipate what critical tasks must be accomplished in order to extinguish a fire, it is not always possible to predict how many firefighters it will take to accomplish those tasks. The number of personnel and the amount of equipment necessary to accomplish the critical tasks will vary due to the following factors:

- Response time
- Building construction
- Number of floors the fire is located above ground level
- Number of occupants
- Exposures
- Physical and emotional condition of occupants
- Extent of fire upon arrival (flashover)
- Built-in fire protection
- Area of fire involvement
- Firefighter or civilian injuries
- Apparatus or equipment failure

On-scene operations, critical tasking, and an effective emergency response force are the elements of a standards-of-coverage study that aids in determining appropriate staffing levels, the number of companies needed, optimal deployment strategies, and the priority duties to be performed on the fire ground or other emergency incident scene. A fire and EMS department must be able to determine what tasks need to be completed in order to have a positive influence on the outcome of the situation, and the number of personnel and apparatus required to complete those tasks in an effective manner.

The variables of fire growth dynamics, along with property and life risks, combine to determine the fire ground tasks that must be accomplished, and to a certain extent the order in which they must be accomplished, to preserve life and mitigate loss. These tasks are interrelated but can be separated into two basic types: *fire control* and *life safety*.

Fire control tasks are those related to applying a fire suppression product, most generally water, on the fire, and removing the products of combustion from an enclosed environment. Life safety tasks are those related to finding trapped, disoriented or incapacitated victims and safely removing them from the structure or shielding them from the hazard. Fire control tasks are generally accomplished by using one of two methods:

- Hand-held hose lines are mobile and produce water flows of up to 250 gallons per minute (gpm). These are generally used during interior or offensive firefighting activities.
- Master streams are generally used from stationary positions, and produce a flow of up to 1,000 gpm. They are used primarily during exterior or defensive firefighting activities.

The decision to use either hand lines or master streams depends upon the stage of the fire, the threat to life safety and adjoining property, and the specific strategy and tactics employed by the fire incident commander when sufficient firefighting resources have reached the scene. If the fire is in a pre-flashover stage, firefighters can make an offensive fire attack into a building by using hand lines to attack the fire and shield trapped victims until they can be safely removed from the structure.

If a fire is in its post-flashover stage and has extended beyond the capacity or mobility of handheld hoses, or if the structural damage and the threat of collapse present a significant risk to the safety of firefighters on scene, the structure will be declared lost. In this situation, master streams are positioned to extinguish the fire and keep it from advancing to surrounding exposures. First-arriving firefighters may use a transitional “defensive to offensive” strategy (discussed below) to limit or remove an environment suspected of presenting an immediate danger to life or health (IDLH) of trapped victims while awaiting the arrival of additional resources.

Life safety tasks assigned are based upon the number of occupants, their location, their status (e.g., awake, unconscious), and their ability to take effective self-preservation action. For example, ambulatory adults need less assistance than non-ambulatory adults or children. The very young and the elderly generally require more assistance, which requires greater resource utilization.

The key to any fire department's success at a fire includes a rapid response and efficient fire scene deployment, as well as adequate staffing and coordinated teamwork. These key elements are relevant regardless of whether the fire ground tasks are all fire-flow-related or a combination of fire flow and life safety activities.

Because of its greater potential for saving lives and limiting property damage, LF&EMS utilizes aggressive offensive attacks whenever possible based on a risk-benefit analysis. The first objective is to put a hose line between any fire victims and the fire, and to rescue those victims by removing them from proximity to the hazard. The second objective is to confine the fire to the building of origin, floor of origin, or room of origin in that priority order, and to mitigate the IDLH atmosphere.

Before on-scene procedures can be established, the initial Incident Commander must select an appropriate initial strategy – *Offensive*, *Defensive*, or *Transitional*.

*An **offensive strategy*** involves an aggressive interior fire attack operation. The top priority with this strategy is to rescue trapped victims. Because the department attempts to limit the potential for fire to spread beyond the room of origin and to limit fire-related deaths and injuries, the aggressive offensive attack is utilized wherever possible, taking into account the safety of personnel, the availability of on-scene resources, and the size and scope of the emergency situation.

The objective of an offensive attack is to stop the fire and confine it to the area of origin as quickly as possible. The offensive attack may also apply to wildland fire where firefighting crews directly attack the head, or front of an advancing fire. Although this can be an effective tactic, this mode of attack also poses an increased element of danger that warrants a higher degree of vigilance by the incident commander and all crew members.

A transitional strategy consists of an initial exterior attack positioned to quickly transition (redeploy) into a coordinated interior attack. This transition can be either a defensive exterior to offensive interior attack, or an offensive exterior to an offensive interior attack. In either case, the objective is to knock down as much fire as possible from the exterior and then move to the interior to effect total extinguishment. The transitional attack is intended to slow the spread of fire until entry can be made to offensively engage the fire.

The transitional attack is an effective tactic to employ when the OSHA Two-In/Two-Out rule cannot be met initially. Two-In/Two-Out refers to the OSHA requirement that two firefighters be on scene, equipped and in position for immediate entry, before at least two additional firefighters are allowed entry into an IDLH environment. The objective of a transitional attack is to buy time for potential victims, and to provide a safer environment for an interior offensive attack.

A ***defensive strategy*** generally consists of an exterior attack designed to confine a fire to the structure of origin. No attempts are made to rescue civilian fire victims from the interior of a structure because, by virtue of the fire's extent, victims not already evacuated are presumed to be beyond rescue. A "fully involved" structure is one that is at high risk for collapse, and even modern firefighting protective equipment is not sufficient to allow rescuers to safely enter such a super-heated environment.

In the case of a large structure, a defensive attack can also be an interior attack that saves a substantial portion of the structure from the fire by taking advantage of the building's design. The objective of a defensive attack is to protect an uninvolved area or building, or other exposures.

A defensive attack may also apply to wildland fires when crews are deployed well ahead of a fire and attempt to change the fire's course, remove unburned fuels from the fire's path, or decide which neighborhoods can be saved and maintain safe escape routes for the use of fleeing residents.

Apparatus Types

Fire Engines - The department currently staffs eight NFPA-designated 'triple combination' pumpers. These are apparatus equipped with a fire pump, hose

complement, and water tank. Lynchburg's fire engines are also given a Class-A designation by the Insurance Services Office (ISO).

The units are always staffed with at least three firefighters: one captain, who functions as the lead worker in charge of the company; one master firefighter[8]; and at least one firefighter. As part of this three-person complement, Lynchburg's engines are almost always staffed with at least one paramedic or EMT-Intermediate, allowing each company to operate as both a fire suppression and first response advanced life support (ALS) unit. Under current department policy, some of these resources may be staffed without a paramedic and operated as basic life support units on a day-to-day basis due to staffing limitations.

The role of the engine company during fire suppression efforts is to pump water through a variety of fire hose and associated appliances onto the fire in order to lower the temperature of the fuel below its ignition temperature.

Ladder Trucks - The department currently staffs two types of ladder truck companies. The first type is a 105' straight ladder (no bucket), carried on a single chassis with all-steer capability[9]. The second type is a 100' elevating platform carried on a straight chassis without all-steer capability. The department also utilizes a reserve ladder truck with a 95' straight ladder carried on a tractor-trailer tillered aerial apparatus chassis.

The role of the truck company during fire suppression efforts it to provide forcible entry; vertical and positive pressure ventilation, which aids in fire suppression efforts conducted by the engine companies; search and rescue; salvage and overhaul; elevated work above ground level on ladders; and/or elevated master streams for defensive firefighting operations.

Heavy Rescue – The department currently staffs a heavy rescue unit, assigned to Station 3 (Fort Hill). The rescue is staffed by a master firefighter and two other firefighters. The firefighters assigned to *Rescue 1* are a minimum of EMT-Basic certified. At least one is trained as a technical rescue specialist and at least one is trained as a hazardous materials technician.

[8] LF&EMS is in the second of a three year transitional program to implement master firefighters into the ranks of the department to act in the role of assistant company officers. There are currently twenty-two of a planned thirty-three master firefighters who have been promoted to the rank. The final promotional process will take place in the fall of 2005, at which time there will be one master firefighter designated for each engine and truck company.
[9] "All-steer" meaning all wheels can be turned for optimum maneuverability.

The rescue is staff primarily responsible for performing extrication at motor vehicle crashes, search and rescue at fire scenes, and supplementing the technical rescue and hazardous materials specialty teams.

Medic Units (Ambulances) – The department currently deploys four 24-hour dual-role (firefighter/paramedic) Type I medium-duty ambulances normally staffed with at least one Paramedic/EMT-Intermediate and one EMT-Basic[10] certified personnel.

In addition, the department operates a single-role (non-firefighter EMT/paramedic) Type I ambulances staffed with at least two EMT-Basics during the city's "normal weekday business hours" of 8:00am and 5:00pm for the purpose of responding to *transport only*-type calls for service. All of Lynchburg's medic units carry a full complement of advanced life support equipment, and are licensed by the Commonwealth of Virginia as ALS ambulances.

The primary role of the medic unit in LF&EMS' system is the treatment and transport of the sick and injured within the City of Lynchburg. Personnel assigned to staff dual-role medic units are also qualified and able to function as firefighters, which helps augment Lynchburg's overall firefighting force.

Lynchburg also has three additional medic units that are in reserve status. These units can be staffed on an as-needed basis by engine company firefighters when determined necessary by the shift battalion chief.

Brush/Utility Trucks – The department deploys two brush/utility trucks from Station 1 (Downtown) and Station 7 (Lakeside Drive) which are staffed by the engine company crews at those locations based upon call type. These units have a limited but very important application and receive much less use than front-line engines.

The role of the Brush Trucks is to access and fight fire in the wildland and urban/rural interface zone. Brush/utility trucks are four-wheel drive pick-up trucks with "skid units", have a higher ground clearance, and carry hose loads more suited for wildland firefighting.

[10] Depending on daily staffing allowances, medic units may be staffed with two Paramedics/EMT-Intermediates.

Water Tanker – The department deploys one 2,000-gallon water tank truck which is utilized for Lynchburg's non-hydranted responses and other incidents where water resources are limited. These resources may be deployed for structure fires, natural cover fires, or aircraft emergency responses at the Lynchburg Regional Airport. Lynchburg's tanker is deployed from Station 8 (Old Graves Mill Road) and is staffed by the engine company crews at that location based on call type. Like the brush trucks, water tanker has a limited but very important application and receive less use than front-line engines.

Chief's Car – The department deploys two Battalion Chief's vehicles, staffed by Battalion Chiefs. The department utilizes sport utility vehicles fully equipped with emergency response equipment and a command and control station/board. Each battalion chief is responsible for coordinating the activities and incident responses for a "battalion."[11] Battalion Chiefs are also a minimum of EMT-Basic certified and have the necessary equipment to provide BLS first response.

Critical Tasks (Firefighting)

Critical tasks are tasks that must be conducted in a timely manner by firefighters at structure fires, in order to control the fire prior to flashover or to extinguish the fire in a timely manner. A fire department is responsible for assuring that responding companies are capable of performing all of the critical tasks in a prompt and proficient manner.

When identifying critical tasks, firefighter safety must be considered the top priority. Whenever interior fire fighting operations are necessary, which require the use of protective equipment, including turnout gear, SCBA, and a minimum of a 1¾ inch hose line, additional personnel must be staged to perform rescue functions for interior fire fighting personnel, and a command structure should be in place. Since the OSHA 2-in/2-out standard, all agencies will follow that definition of hazardous atmosphere and have in place a Rapid Intervention Team (RIT) as the effective response force assembles on the scene.

Below are definitions of critical tasks that are to be performed at the scene of a structure fire.

[11] LF&EMS operates two battalions. Battalion 1 includes the service areas of Stations 1, 2, 4, and 5; Battalion 2 includes the service areas of Station 3, 6, 7, and 8.

- Attack Line: A medium sized hose that produces 100+ gpm and is handled by a minimum of two fire fighters, or a larger hose that produces 200+ gpm and is handled by three or more fire fighters. Each engine carries a set of attack lines that are either pre-connected to the pump, folded on the hosebed, or in a special pack for carrying into high-rise buildings.

  Attack line selection to use depends on the type of structure, the distance to the seat of the fire, and the stage of the fire. The pre-connected lines are the fastest to use but are limited to fires within 150 feet of the pumper. When attack lines are needed beyond this limit, the hose bed lines or high-rise lines are used. A larger attack line will be used when the fire is already beyond the flashover stage and threatens an unburned portion of the structure.

- Search and Rescue: A minimum of two fire fighters assigned to search for living victims and remove them from danger while the attack crew moves between the victims and the fire to stop the fire from advancing on them. A two person crew is normally sufficient for most risk structures, but more crews are required in multi-story buildings or structures with people who are not capable of self-preservation.

- Ventilation Crew: A minimum of two fire fighters to open a horizontal or vertical channel when the attack crew is ready to enter the building. Vertical ventilation or ventilation of a multi-story building can require more than two fire fighters. Ventilation removes superheated gases and obscuring smoke, preventing flashover and allowing attack crews to see and work closer to the seat of the fire. It also gives the fire an exit route so the attack crew can "push" the fire out of the opening they choose and keep it away from endangered people or unburned property. Ventilation must be closely timed with the fire attack. If it is performed too soon, the fire will get additional oxygen and grow. If performed too late, the attack crew cannot push the fire in the direction they want. Instead, the gases and smoke will be forced back toward the firefighters and their entry point, which endangers them, any victims they are protecting, and unburned property.

- Back-up Line: Usually the same size as the initial attack line, a back-up line is taken in behind the attack crew to cover the attack crew in case the fire

overwhelms them or a problem develops with the attack line. This function requires a minimum of two fire fighters. A larger line, staffed by three or more fire fighters, will be used for backup instead of a medium line when the fire could grow if not stopped by the attack line.

- Rapid Intervention Team: A minimum of two fire fighters equipped with self-contained breathing apparatus (SCBA) and available near the entry point to rescue the attack, search and rescue, or back up crew if something goes wrong. When the first four fire fighters are on scene, the two outside fire fighters are also know as the initial RIT. When the balance of the effective response force arrives and interior fire attack is continuing in hazardous atmospheres and conditions, a full company is assigned to be the rapid intervention team.

- Exposure Line: Any sized attack line or master stream appliance staffed by two or more fire fighters and taken above the fire in multi-story buildings to prevent fire expansion. Also used externally to protect nearby structures from igniting from the radiant heat.

- Pump Operator: One fire fighter assigned to deliver water under the right pressure to the various hoselines in use (attack, backup and exposure lines), monitor the pressure changes caused by the changing flows on each line and ensure that a water hammer doesn't endanger any of the hoseline crews. This firefighter also completes the hose hookups to the correct discharges and completes the water supply hookup to the correct intake. The pump operator can sometimes make the hydrant hookup alone if the pumper is near a hydrant (50 feet). However, more distant hydrant locations sometimes preclude this action.

- Water Supply: A crew of one or more firefighters who must pull the large diameter hose between the pumper and the nearest hydrants (if not laid out on the way in), provide hookup to the hydrant and deliver a water supply to the pumper before the pumper's water tank runs dry. Depending on needed fire flow, this could require several additional vehicles with the resultant number of operators.

- Command: An officer assigned to remain outside of the structure to coordinate the attack, evaluate results and redirect the attack, arrange for more resources, and monitor conditions that might jeopardize crew safety.

- Safety Officer: As used in the incident command system (ICS), this is an officer assigned to ensure that department members on scene are following department policies and procedures to ensure the safety of the entire crew.

This level of resources can set up the equipment and simultaneously handle the tasks of fire attack, search and rescue, ventilation, backup lines, pump operation, water supply and command, all within a few minutes. If fewer firefighters and equipment are available, or if they have longer travel distances, then the department will not be able to accomplish an objective such as confining the fire near or to the room of origin.

Because the average time from a fire's incipient stage to flashover is five to ten minutes, the travel times selected for any fire agency should allow the fire department to arrive before flashover occurs in the majority of cases (about 4 out of 5). Total reflex times are longer than the flashpoint time, but this is compensated for by the fact that a portion of the fires will still be in the smoldering or incipient stage when reported. This will normally mean a longer time before flashover occurs. In the long run, the department will get to most fires before or by the time flashover occurs. One-in-five fires that is not reached before flashover is a case noted earlier where the fire reached flashover stages more rapidly because flammable accelerants were present or because the fire burned a long time before being reported.

Critical tasks are described below. The allocations assume that emergency crews are committed to those assigned tasks (worst-case scenario), and would not be available for re-assignment until after the balance of the alarm, or response package, arrives on scene.

Initial Deployment

The initial fire ground actions begin with the arrival of the first company and continue, sequentially or in parallel, as tasks are completed and additional resources arrive. Initial support functions occur as coordinated and simultaneous operations, but can also occur slightly later in time than initial attack functions.

The following table illustrates the **number of personnel** assigned to initial attack and initial support functions at the scene.

Table 5.2 **Personnel Required for Initial Deployment Tasks**

Critical Task	Minimum Risk	Moderate Risk	Significant Risk	Maximum Risk
Size Up and Command	1^	1	1	1
Accountability	1^	1	1	1
Offensive Fire Attack	2^	2	4	4-6
Pump Operations/Water Supply	1	1	1	2
Search and Rescue		2	2	4
Ventilation		2	2	4
Aerial Device Operator*		1	1	1
Sub-total: Initial Attack	**3-5^**	**10**	**12**	**17-19**
Rapid Intervention Team		2	4	4-6
Back Up Lines		2	4	4
Salvage and Overhaul	**	**	**	**
Rehabilitation		2	2	4
Designated Safety Officer	1^	1	1	1
Sub-total: Initial Support	**1**	**7**	**11**	**13-15**
Total: Initial Attack and Initial Support	**4-6^**	**17**	**23**	**30-34**

^ The engine company officer can serve multiple roles at minimum risk incidents.
* An aerial device operator would only be necessary if such device is being deployed at the incident.
** Salvage and overhaul is addressed by effective response force as priorities shift.

Secondary Support

It should be noted that secondary support functions are not all conducted concurrently, and in some cases more than one task can be accomplished by the same personnel, reducing the overall number of required personnel. Examples of this include the same truck company of three personnel performing forcible entry, then ventilation, salvage, and overhaul. On the other hand, there may be instances

where a second crew needs to relieve the first fire attack crew prior to the task being completed.

Secondary support functions include:

- Salvage (functions which prevent further property damage from occurring)
- Overhaul (functions which ensure that the fire is completely extinguished)
- Breathing air supply, equipment maintenance, and on-scene lighting support activities

Secondary support functions may be performed by:

- Fire suppression companies reassigned after initial deployment task completion
- Additional fire suppression companies called to the scene specifically for this purpose
- Logistics personnel who have been called to the scene to provide air re-supply, lighting and rehab.

In the event of a substantial (greater) fire, or on request of an Incident Commander, additional alarm assignments provide the necessary chief officers and support staff to provide command support. The dispatch of the additional alarms provides the following: Public Information Officer, department's designated Health & Safety Officer, and other support personnel. This relieves the on-scene commander of responsibilities not directly related to command of incident operations.

LF&EMS has used its experience, knowledge, and historical information to determine what constitutes an effective response force. These staffing projections are accurate for the majority of the working fires within Lynchburg's response area. The need for more personnel may arise on any fire scene at any time. Fire conditions dictate the response needed for any given fire, even if that response exceeds the requirements listed in this document. The department relies on the experience and professional judgment of its company and chief officers to request additional resources early in an incident whenever their expertise suggests that those resources might be required. These resources can be readily obtained through on-duty staffing, mutual aid, or the callback of off-duty Lynchburg personnel.

Critical Tasks (Emergency Medical Services)

LF&EMS provides both EMS first response and ambulance transport services and responds to approximately 13,000 medical service calls per year. Because the majority of the department's call load involves emergency medical service delivery, every LF&EMS engine company is equipped as an advanced life support (ALS) first response unit, and is almost always staffed with at least one firefighter/paramedic (or EMT-Intermediate). In addition, all Lynchburg medic units are ALS transport equipped and staffed with a minimum of one paramedic/EMT-Intermediate and one EMT-Basic.

In order to preserve the more limited ambulance capacity within the EMS system here, Lynchburg engine and truck companies are dispatched on a first-out basis to perform non-emergency patient evaluations. These calls are most frequently defined as nonspecific medical evaluations, and are indicated when the caller reports no priority symptoms in response to questioning by a dispatcher.

Upon arrival, the first response fire suppression crew rapidly assesses the patient, determines the level of intervention needed, if any, and connects the patient with the appropriate level of assistance. Most frequently these calls result in a patient evaluation conducted by the suppression crew.

Options for patient intervention include providing medical evaluation and advice to a patient who does not require transport to a medical facility. In some cases, after a field evaluation has determined that no medical intervention is required, the patient is left in the care of a relative or other appropriate responsible party who will either monitor the situation or transport the patient to a medical facility by private vehicle.

For requested non-emergent transports from a medical facility – including licensed nursing/long-term care facilities, doctors' offices, medical clinics, assisted living facilities, foster care homes – or a doctor's or home health care nurse's request for transport from any location – the non-emergency transport medic unit is dispatched to the location. The department works with a third-party contractor through the Virginia Department of Medical Assistance Services (DMAS) to pre-schedule as many of these as possible.[12]

[12] Non-emergency transports are often required to be pre-authorized for Medicare and Medicaid insured patients. The Virginia Department of Medical Assistance Services contracts with a third-party private firm, Logisticare, to coordinate and subcontract all non-emergency medical transports in the Commonwealth of Virginia.

EMS calls for service often require treatment of more than one patient. These calls include vehicle accidents, construction or industrial accidents, fires, and any other event that occurs with several people in close proximity. Patient conditions can range from minor cuts and bruises to life-threatening illnesses or injuries.

In addition to providing additional EMS system capacity, our first-response fire companies also serve to augment our two-person ambulance crews at all emergency medical incidents. This is done to expedite life-saving treatment when required, and to ensure that there are enough trained responders on scene to handle the incident safely and effectively.

Dispatchers at the Emergency Communications Center receive and triage calls to establish the correct initial response based on pre-determined levels of response provided to the center by LF&EMS. Dispatchers are not certified as emergency medical dispatchers and receive very little training in medical dispatching, other than how to follow the recommendations of the pre-determined response mechanisms provided by the computer-aided dispatch system. LF&EMS personnel are allowed to amend responses after the initial dispatch, based on patient information provided by the dispatcher.

Below is a table that illustrates the many tasks which must be accomplished simultaneously during three life-threatening medical scenarios that occur frequently in our area. While some of these tasks can be done by the same person in rapid sequence; Overall treatment requires additional response personnel.

Table 5.3 **Critical Tasks Cardiac Arrest/Stroke/ Multi-System Trauma**

Critical Task	Cardiac Arrest	Stroke	Multi-System Trauma
Patient Assessment	2 per patient	2 per patient	2 per patient
Airway Management/Intubation	2 per patient	2 per patient	2 per patient
Cardiac Defibrillation	1	N/A	N/A
CPR	1	N/A	N/A
EKG Monitoring	1	1	1
IV/Pharmocology	1	1	1
Splint/Bandage/Immobilization	N/A	N/A	1
Patient Lifting/Packaging	2 – 4	2 – 4	2 – 4
Medical Information Collection	1	1	1

Critical Tasks (Special Operations)

LF&EMS currently maintains two separate special teams:

- Hazardous Materials (Haz Mat) Team – a non-state funded team, operated out of Fire Station 7 (Lakeside Drive).
- Technical Rescue Team – A Virginia Department of Fire Programs designated specialty rescue team, operated out of Fire Station 1 (Clay Street). Lynchburg's Technical Rescue Team operates via a web of mutual aid agreements among municipalities within State Division 3.

LF&EMS utilizes a two-tiered approach to incidents requiring special operations capabilities. Each line company has personnel trained to the "Operations" or similar level in hazardous materials response, technical rescue, and water rescue, and maintains limited equipment for these functions. Of additional benefit to the community is the fact that many personnel have received initial and on-going training in technical rescue and are available as part of regular fire companies on a daily basis. These companies respond when dispatched as they would to other emergencies. Upon arrival, they assess whether they can mitigate the emergency with their own resources or if the special tools and expertise of the specialty teams are required.

Specialty teams may be dispatched on the initial alarm, or may be requested by first arriving companies based on their size-up of the incident. In addition to the two specialty teams, the LF&EMS is routinely called upon to provide special standby coverage for events such as the local high school and university sporting events, concerts and cultural events, and other events with anticipated large crowds or potential activities that may result in injury.[13]

Hazardous Materials

The HazMat Team is assigned to Fire Station 7 (Lakeside Drive). The team responds from this location primarily because there is available space and it has access to roadways which are primary transportation corridors for chemical delivery.

Members who perform the duties of this team, do so as an ancillary responsibility to their normal suppression and emergency medical service job requirements. In an effort to fulfill the requirements of an efficient staffing level, the Operations

[13] As required by the Lynchburg Department of Parks & Recreation in order to receive a "Special Events Permit."

Chief has requested that all personnel assigned to Station Seven become trained to the Technician level. Additionally, the department requires that at least one member assigned to Rescue One, which is located at Station 3 (Fort Avenue), be certified to the Technician level or above. Through internal and state-provided opportunities, the team has nearly met that goal. At the present, the team consists of 28 personnel who are trained to either the Technician or Specialist Level.

The Virginia Department of Emergency Management Contract Teams maintain at least ten team members available every day to respond to incidents within their given area. The Roanoke team has 16 Technicians available on duty each day. The LF&EMS team is currently not a contract team with the Commonwealth of Virginia but has attempted to mirror the operations of the 13 contract teams because of training and standard of coverage for moderate responses dealing with hazardous materials. However, the team has responded to more incidents than two of the 13 state teams combined. Lynchburg's team still maintains the desire to become a state contract team for better response alignment with the regions of the State of Virginia and to be more appealing for state funding.

This SORC establishes a three-tiered response plan for hazardous materials emergencies. The basis used for the establishment of the three levels relates to:

- Level of technical expertise required to abate the incident;
- Extent of local, state, and federal government and private industry involvement required to assist in hazard abatement;
- Extent of civilian evacuation;
- Extent of injuries and/or deaths related to the hazmat incident
- Extent and involvement of decontamination procedures.

Level I Incident

- Spills, leaks, releases, ruptures, and/or fires involving hazmats which can be contained, extinguished, and/or abated utilizing equipment, supplies, resources immediately available to the first responders (Operations Level) of the LF&EMS; and
- Incidents that can properly be handled by LF&EMS personnel whose qualifications are limited to and do not exceed the scope of training explained in SARA TITLE III (OSHA), Title 29 CFR Section 1910 with reference to first responder

- Hazmat incidents which do not require evacuation of civilians beyond the perimeter of incident scene isolation.

Level II Incident

- Any LF&EMS officer can upgrade a Level I incident to a Level II incident.
- A hazmat incident which can only be identified, tested, sampled, contained, extinguished, and/or abated utilizing the expertise and resources of the LF&EMS Hazmat Response Team; a hazmat incident which requires the use of any kind of specialized gear, tools, equipment or knowledge beyond the scope of a First Responder; and/or
- Hazmat incident which requires the evacuation of civilians within the area of the fire department having jurisdiction; and/or
- Fires directly involving hazardous materials; and/or
- Incidents that only be properly by LF&EMS personnel whose qualifications meet or exceed the scope of training explained by SARA Title III (OSHA), Title 29 CFR Section 1910 with reference to Hazmat Specialists.

Level III Incident

- Any LF&EMS Officer can upgrade a Level I or a Level II incident to a Level III incident.
- Any actual or threat of spills, leaks, releases or ruptures which can or must be contained and/or abated only by utilizing highly specialized equipment and supplies available to industrial response personnel or other governmental agencies. Such equipment, techniques and qualified personnel are in excess of or are in addition to those resources available from the on-scene Hazmat Response Team; and/or
- Fires involving hazmats that are allowed to burn due to the ineffectiveness or dangers of the use of any kind of extinguishing agent; and/or there is a real threat of large container failure; and/or an explosion, detonation, BLEVE or container failure has already occurred; and/or
- Hazmat incidents which require a significant evacuation of civilians or evacuation has extended across jurisdictional boundaries; and/or there are serious civilian injuries and/or deaths as a result of the hazmat incident; and/or

- Hazmat incidents which require additional Hazmat Response Team personnel or an additional Hazmat Response Team on scene; and/or extensive decontamination of LF&EMS personnel, equipment or civilians is required; and/or
- The hazmat incident has become one requiring multi-agency involvement.
- The incident can only be properly handled by LF&EMS personnel whose qualifications meet or exceed the scope of training explained in SARA TITLE III (OSHA), Title 29 CFR Section 1910 with reference to Hazmat Specialist.

When an incident presents a hazardous materials spill, release, or exposure requiring skills and equipment beyond the scope of those trained to the HazMat Operations level, the Haz Mat Team is requested. The initial response is often limited to the rescue company, a medic unit and the first due battalion chief. Lyn-Com also notifies Station 7, placing them on stand-by for a potential full deployment of on-duty team members. This initial response allows the battalion chief and a Haz Mat technician to perform an assessment of the incident and either upgrade the response or disregard a full deployment.

While en route, the team communicates by radio and cellular telephone with the on-scene Incident Commander and various state agencies to begin designing specific operational priorities specific to the incident. Upon arrival, the HazMat Team is designated as the HazMat Branch or Group under the Incident Command System (ICS) organizational structure. The Team Leader or Supervisor confers with the Incident Commander to further assess:

- Relevant safety issues and additional resource needs
- Hot/Warm/Cold Zone designation
- Evacuation/isolation requirements
- Product identification / determination
- Life safety and environmental damage and exposure concerns
- Release/spill mechanism and current status
- Risk/benefit analysis
- Determination of strategy and tactics
- Required notifications

Following this initial briefing with the Incident Commander, the HazMat Team initiates interventions:

- Reconnaissance

- Develop mitigation plan
- Defensive and/or offensive operations (confine vs. contain)
- Debriefing, documentation, demobilization

General Hazardous Materials Team assignments are as follows:

Table 5.4 **General Hazardous Materials Team Assignments**

Critical Task	
Incident Command and Safety Officer	2
Site Control (Detection and Monitoring)	2
Referencing	2
Entry and Backup Teams	4
Decontamination and medical group	2

Below is a brief description of the roles and responsibilities of the tasks outlined above.

- **Incident Command and Safety Officer**: In the event of a Hazardous Materials incident the first arriving unit shall establish command. This person is ultimately responsible for the overall incident. He/She develops and implements strategic decisions. The incident commander may not be a Hazardous Materials (Haz-Mat) Technician or Specialist and therefore must delegate the tactical or operational responsibility to a qualified and competent *Haz-Mat Branch Officer.*

  While the Incident Commander is ultimately responsible for the outcome of the incident, The Haz-Mat Branch Officer will command and control all personnel working in the hazardous material operational area. It is recommended that the Haz-Mat Branch officer at all Haz-Mat incidents be certified to the Specialist level. The Code of Virginia requires the appointment an Incident Commander and for that individual to in turn appoints an Incident Safety Officer at all hazardous materials incidents. An incident command system must be utilized. In the event the incident will be mitigated with offensive control tactics, it is recommended that a separate *Haz-Mat Safety Officer* be established, if the original Incident Safety Officer is not trained to

the Technician level. The Haz-Mat Safety officer coordinates all safety-related activities for the Haz-Mat Branch and advises on all aspects of the health and safety of personnel operating at the incident.

- **Site Control:** Site control reports to the Haz-Mat Branch Officer and will consist of a minimum of two Hazardous Materials Technicians, preferably, one of them a Specialist. They are responsible for establishing the Control Zones utilizing information from the reference group and detection and monitoring equipment. They will also control the movement of all people and equipment through all access routes, which will help control of all contaminants. This will be a continuous processthroughout the incident.

- **Reference:** The Reference Group reports to the Haz-Mat Branch officer. This group will consist of a minimum of one Hazardous Materials Technician and one Hazardous Materials Specialist. They provide technical information by collecting and interpreting information about the physical and chemical properties of the product or products at the incident. They determine related hazards in order to help analyze potential incident action plans and evaluate appropriate personal protective gear. The reference group will develop the chemical hazard profile data sheet. Utilizing this data, they help develop a tactical safety plan. The tactical safety plan must be discussed with all members operating at the incident.

- **Entry and Backup Teams:** The Entry Team shall consist of one Hazardous Materials Specialist and one Hazardous Materials Technician. The Hazardous Materials Specialist shall take the role of team leader, and report to the Haz-Mat Branch Officer. Their responsibilities include working in the Hot Zone to carry out tactical assignments performing rescue operations, and mitigating the hazards involved. The Back-up Team is required by OSHA 29CFR 1910-120 and the Respiratory Protection Standard CFR 1910-134. This back up or rescue team must mirror the Entry Team with regard to personal protective gear and must be in the ready position at all times while the Entry Team is operating in the hazardous area or Hot Zone. Both of them may be Technicians. Anytime there is an Entry Team there must be a Back-up Team.

- **Decontamination and Medical Group:** The Decontamination (Decon) Group shall as a minimum consist of two Hazardous Materials Technicians.

They will ultimately be responsible for overseeing the setting up of the appropriate level of decontamination. They are also responsible for establishing contamination reduction corridors, and identifying contaminated people and equipment. They maintain the control of persons within the decon area. These members may be assisted by operation-level trained members during the initial setup but all must have technician training to operate technical decontamination. The Medical Group shall consist of a minimum of one Operations Level EMT and one Operations Level Paramedic. Their duties include pre and post entry medical screenings of entry and backup personnel. A medical clearance must be provided before and after Technician-level operations at the scene. They are also responsible for the treatment of the exposed or contaminated members and for coordinating accurate reports to the local hospitals for the acceptance of incoming patients. If there is an Advanced Hazardous Materials Life Support certified Paramedic available, he/she shall assume responsibility of this patient care at the incident. It is the Lynchburg's Fire and EMS Hazardous Materials Team's goal to have at least six Paramedics trained to the Advanced Haz-Mat Life Support Level. This will enable them to render advanced life support treatment modalities for Toxidromes that may be involved at the incident.

Additional companies may be used in support roles as needed. These may include:

- Incident Command and Command Staff
- Decontamination support
- Fire suppression standby
- Ventilation
- Scene/perimeter control
- Medical support

Technical Rescue

The Technical Rescue Team is assigned to Station 1(Clay Street). Technical Rescue responds out of this location primarily because Station 1 is one of two stations with a staffed ladder truck company, and the technical rescue skill set is very useful in regular truck company operations. Technical rescue services are provided within the city limits and are also provided throughout Division 3, as the LF&EMS is a regional Technical Rescue Team designated through the Virginia Department of Fire Programs. Industry and government are required to have a

designated confined space rescue team in order to obtain certain confined space entry permits. The department's Technical Rescue Team also provides this service.

Personnel are certified in five different disciplines: high-angle rope rescue, structural collapse, below-grade trench rescue, vehicle extrication and confined space rescue. With the on-scene support of awareness-level trained first responders, the TRT can devote its full attention to the rescue operations. The TRT also supports dive operations with its boat, divers and land-based dive operations support management functions.

Upon arrival, the Technical Rescue Team is designated as the Rescue Branch or Group under the Incident Command System (ICS) organizational structure. The Team Leader or Supervisor confers with the Incident Commander to further assess:

- Risk/benefit analysis
- Additional resource needs
- Strategy and tactical priorities
- Scene security and control
- Incident documentation
- Air monitoring (confined space)
- Electrical vault or power line concerns
- Fire suppression standby (if applicable)
- Required notifications

High-angle Rope Rescue

High angle rope rescue utilizes multiple/redundant rope systems, lowering a rescuer to perform a pick-off(s). Whenever possible, lowering is the preferred method. When required, a lowering/hauling system will be used. Upon arrival, the scene is secured, a rope system is established, then the rescuer will go over the edge, make contact with the victim, place a harness on the victim, and then the rescuer and victim are lowered or raised to a safe location.

Structural Collapse

TRT members have structural knowledge with skills in shoring, hoisting, lifting and cutting to search for and reach trapped victims. The TRT's equipment mirrors that of Federal Urban Search and Rescue Teams. Upon arrival at a structural

collapse incident, the scene is secured, the victim(s) is located, entry is made into the structure, and then the victim(s) is treated and extricated.

Below-grade Trench Rescue
The TRT is fully equipped to allow the team to install shoring panels and air shoring. Upon arrival, the scene is secured, trench walls are secured, unearthing begins, the patient is treated and then removed. The TRT is equipped with hand tools, power tools, beams, planks, ladders, digging tools and PPE.

Confined Space
Confined space rescue is supported by a fiber optic articulating camera, listening devices, supplied air system and hard wire communication. The TRT uses a tripod lowering and hoisting system for entry/exit into/from below surface systems and holds of container/vessels.

Upon arrival at a confined space incident, the scene is secured, victim is located, entry is made into the confined space, victim is treated and then extricated.

Establishment of an Effective Response Force

Once critical tasks have been identified and defined, an effective emergency response force can be established. This force is defined as the number of personnel and amount of equipment that must reach an incident in a specific response zone within the maximum total reflex time goal, from the time of the call to the units' arrival on the scene. An effective response force must be trained and equipped to handle a variety of fire, rescue, special hazard, and emergency medical incidents, shortly after they are reported. In order to accomplish this, companies and units must be located close enough to the incident to arrive within the maximum prescribed response time with the full assignment of fire companies according to the risk level of the structure, situation, or event.

The risk of fire, medical emergency, or other emergency events can never be held to zero. Thus, the objective of any standard of coverage study is to identify the balance among distribution, concentration, and response reliability that will keep hazard risks at an acceptable level, while maximizing the preservation of life, property, and the environment. The maximum prescribed travel times act as the limit to effectiveness – if fire stations are placed too far apart, the minimum effective response force can not get to a fire in a timely manner.

The following table, part of critical task analysis, illustrates in a matrix LF&EMS' baseline fire flow response goals by number of engines and response time:

Figure 5.6 **Baseline Fire Flow Response Goals**

Risk Types	No. of Companies	Company Due-In (Time in Minutes)		
		First	Second	Third plus
Maximum 4,000+ gpm	5	4	5	8
Significant 3,000+ gpm	4	4	6	8
Moderate 1,000 - 2,000+ gpm	3	4	8	8
Low < 1,000 gpm	1	4	-	-

It is important to get all of the required firefighters to a fire scene quickly because fire suppression is a simultaneous and coordinated activity.

Standard First Alarm Response

A minimum effective initial response force has been determined, based on fire flow capabilities, critical fireground tasking, rapid emergency medical intervention, and adequate and capable special rescue and hazard mitigation functions.

In areas without fire hydrants, the standard response assignment is supplemented with water tankers to meet the additional anticipated needs for water supply. Likewise, for specialty functions such as wildland fire response or special rescue considerations, response forces are modified or augmented to include special equipment and/or trained personnel.

Special Risk/Hazard Response

For a special risk or hazard area, the initial standard response force may be amended by the responding company or chief officers based upon special conditions, reports, or use of the structure, facility, or area. Amending or augmenting the response package may include the dispatch of department resources deemed appropriate for the mitigation of the reported incident.

Where incident notification clearly indicates that the incident involves hazardous materials beyond the management capabilities of the initial response company, the department's Hazardous Materials Team may be ordered during response.

Where incident notification clearly indicates the need for technical rescue services, the department's Technical Rescue Team may be ordered during response. In addition, the department's truck companies carry a smaller complement of technical rescue equipment, and a number of TRT team members routinely staff LF&EMS' truck companies.

Integrated Time and Performance Objective Standards

Now that all risk, time and critical task issues have been identified and measured, the following integrated performance goal statements have been established. These will be used to model deployment for both distribution and concentration in the later steps of this standard of response cover process.

Structure Fire, Low Risk

Goal: An effective response force of three to four personnel deployed via one engine company.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for emergency service.

Performance Objective: To stop the escalation of a minor fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage near the room of origin, plus limiting heat and smoke damage to near the room of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for the fire control. A second engine and/or truck company may be called to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary.

Structure Fire, Moderate Risk

Goal: An effective response force of seventeen personnel deployed via three engine companies, one truck company, one rescue company, one medic unit, and one battalion chief shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for emergency service. Remaining units, including the battalion chief, shall arrive in 10 minutes total reflex time, for 90 percent of all requests for emergency services.

Performance Objective: To stop the escalation of a moderate fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage to the room of origin, plus limiting heat and smoke damage to near the room of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for fire control. The second engine and truck company provide additional personnel for tasks already started plus ventilation, salvage, and other work as necessary.

Structure Fire, Significant Risk

Goal: An effective response force of twenty-three personnel deployed via four engine companies, two truck companies, one rescue company, one medic unit, and two battalion chiefs shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for emergency service. The second-due engine and first-due truck company shall arrive within 10 minutes total reflex time, for 90 percent of all requests for emergency service. Remaining units, including the battalion chiefs, shall arrive in 14 minutes total reflex time, for 90 percent of all requests for emergency services.

Performance Objective: To stop the escalation of a serious fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage near the room of origin, plus limiting heat and smoke damage to the area or floor of fire origin. The tasks of rapid intervention rescue for trapped firefighters, property salvage, and crew rotation with rehabilitation at a minimum of eleven additional personnel are required on a fire in this risk category.

Structure Fire, Maximum Risk

Goal: An effective response force of thirty to thirty-four personnel deployed via five engine companies, two truck companies, one rescue company, two medic units, and two battalion chiefs shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for emergency service. The second-due engine and first-due truck company shall arrive within 10 minutes total reflex time, for 90 percent of all requests for emergency service. Remaining units, including the battalion chiefs, shall arrive in 16 minutes total reflex time, for 90 percent of all requests for emergency services.

Performance Objective: To stop the escalation of a maximum fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage near the room of origin, plus limiting heat and smoke damage to the area or floor of fire origin. The tasks of rapid intervention rescue for trapped firefighters, property salvage, and crew rotation with rehabilitation at a minimum of thirteen additional personnel are required on a fire in this risk category.

Automobile Fires

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of requests for automobile fire responses.

Performance Objective: To stop the escalation of a vehicle fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage to the vehicle of origin, plus limiting heat and smoke damage to other exposures near the vehicle of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary.

Brush Fires

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for brush fires.

Performance Objective: To stop the escalation of a brush fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage to the vehicle of origin, plus limiting heat and smoke damage to other exposures near the area of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary. Specialized brush fire apparatus may be dispatched as well.

Trash/Dumpster Fires

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for trash/dumpster fires.

Performance Objective: To stop the escalation of a trash/dumpster fire where found. Typically this means conducting search and rescue for any victims, confining the fire damage to the trash container/area of origin, plus limiting heat and smoke damage to other exposures near the trash can/dumpster of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus ventilation, salvage, and other work as necessary.

Explosions

Goal: An effective response force of seventeen personnel deployed via three engine companies, one truck company, one rescue company, one medic unit, and one battalion chief shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for emergency service. Remaining units, including the battalion chief, shall arrive in 10 minutes total reflex time, for 90 percent of all requests for emergency services.

Performance Objective: To stop the escalation of a fire as a result of the explosion where found. Typically this means conducting search and rescue for any victims, confining the fire damage to the room of origin, plus limiting heat and smoke damage to near the room of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for fire control. The second engine and truck company provide additional personnel for tasks already started plus ventilation, salvage, and other work as necessary.

Transportation Emergencies/ Fires

Goal: An effective response force of nine personnel deployed via one engine company, one truck company and the rescue company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of requests for transportation fire responses.

Performance Objective: To stop the escalation of a transportation fire/emergency where found. Typically this means conducting search and rescue for any victims, confining the fire damage to the vehicle of origin, plus limiting heat and smoke damage to other exposures near the vehicle of fire origin. The first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary.

Fire Alarms, Residential

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for all residential fire alarms.

Performance Objective: To investigate the possible presence of potentially hazardous conditions that caused the activation of a residential alarm system. If such conditions are present, the first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary.

Fire Alarms, Commercial

Goal: An effective response force of six personnel deployed via one engine company and one truck company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all commercial fire alarm activations. The full complement of responding apparatus shall arrive within 10 minutes total reflex time for 90% of all responses.

Performance Objective: To investigate the possible presence of potentially hazardous conditions that caused the activation of a commercial alarm system. If such conditions are present, tTe first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary.

Hazardous Materials Emergencies – Level I

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all requests for hazardous materials – level I incidents.

Performance Objective: To stop spills, leaks, releases, ruptures, and/or fires involving hazmats which can be contained, extinguished, and/or abated utilizing equipment, supplies, and other resources immediately available to the first responders (Operations Level) of the LF&EMS.

Hazardous Materials Emergencies – Level II

Goal: An effective response force of twelve personnel deployed via one engine company, one rescue company, one medic unit, one battalion chief and the hazardous materials unit shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all for hazardous materials – level II incidents. The full complement shall arrive within twelve minutes total reflex time.

Performance Objective: To identify, test, sample, contain, extinguish, and/or abate the hazard utilizing the expertise and resources of the LF&EMS Hazmat Response Team, including any kind of specialized gear, tools, equipment or knowledge beyond the scope of a First Responder; evacuate civilians within the area of the fire department having jurisdiction as necessary.

Hazardous Materials Emergencies – Level III

Goal: An effective response force of fifteen personnel deployed via two engine companies (one of which shall be Engine 7), one rescue company, one medic unit, one battalion chief and the hazardous materials unit shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all hazardous materials – level II incidents. The full complement shall arrive within twelve minutes total reflex time.

Performance Objective: To identify, test, sample, contain, extinguish, and/or abate the hazard utilizing the expertise and resources of the LF&EMS Hazmat Response Team, including any kind of specialized gear,

tools, equipment or knowledge beyond the scope of a First Responder; evacuate civilians within the area of the fire department having jurisdiction as necessary.

Technical Rescue Emergencies

Goal: An effective response force of at least twelve specially trained personnel deployed via the first-due engine company and medic unit, in addition to the technical rescue team, including Engine 1, Truck 1, Medic 1, Rescue 1, Battalion 1 and the technical rescue trailer.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all technical rescue emergencies within the City of Lynchburg. The full complement shall arrive within 20 minutes total reflex time for 90 percent of all incidents, also within the City.

Performance Objective: To recognize and identify the need for technical rescue services such as: structural collapse rescue, trench rescue, high/low angle rescue or confined space rescue. Perform rescue or incident stabilization as necessary to accomplish life safety and property conservation and to stop the escalation of the technical rescue incident where found. Typically this means conducting search and rescue for any victims, establishing a safe area of operations, plus limiting further damage than that which has already occurred. The first arriving unit is capable of starting rescue work toward mitigation to involve size-up, requesting additional technical rescue services, performing rescue, shoring, and initiating other steps toward incident stabilization until additional resources arrive.

Miscellaneous Calls for Service

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within nine minutes total reflex time, for 90 percent of all miscellaneous calls for service.

Performance Objective: To investigate the possible presence of potentially hazardous conditions that caused the notification of LF&EMS. If such

conditions are present, the first arriving unit is capable of starting rescue work or advancing a first line for the fire control. Additional engine and truck companies may be summoned to provide additional personnel for tasks already started plus, ventilation, salvage, and other work as necessary.

Emergency Medical Services - Emergent

Goal: An effective response force of five personnel deployed via one engine company and one medic unit shall respond.

Measure: A basic life support unit shall arrive within six minutes total reflex time, for 90 percent of all emergent EMS calls for service. An advanced life support unit shall arrive within 10 minutes total reflex time for 90 percent of all requests.

Performance Objective: Stop the escalation of a medical emergency beyond the level of severity found upon arrival. Specifically, assess patients and prioritize care to minimize death and disability, intervene successfully in life-threatening emergencies, stabilize patients to prevent additional suffering, and provide basic or advanced life support, transporting as necessary.

Emergency Medical Services - Urgent

Goal: An effective response force of two personnel deployed via one medic unit shall respond.

Measure: The first unit shall arrive within six minutes total reflex time, for 90 percent of all urgent EMS calls for service. If it is anticipated that the first due medic unit will have greater than 6 minutes total reflex time, then the first due engine company shall be dispatched with a measure to arrive within 6 minutes total reflex time, and the medic unit to arrive within 10 minutes total reflex time.

Performance Objective: Stop the escalation of a medical emergency beyond the level of severity found upon arrival. Specifically, assess patients and prioritize care to minimize death and disability, intervene successfully in life-threatening emergencies, stabilize patients to prevent

additional suffering, and provide basic or advanced life support, transporting as necessary.

Emergency Medical Services – Public Assist

Goal: An effective response force of three personnel deployed via one engine company shall respond.

Measure: The first unit shall arrive within ten minutes total reflex time, for 90 percent of all public assistance EMS calls.

Performance Objective: Stop the escalation of a medical emergency beyond the level of severity found upon arrival. Specifically, assess patients and prioritize care to minimize death and disability, intervene successfully in life-threatening emergencies, stabilize patients to prevent additional suffering, and provide basic or advanced life support and requesting a transport unit, as necessary.

Emergency Medical Services – Transport Only

Goal: An effective response force of two personnel deployed via one medic unit shall respond.

Measure: The first unit shall arrive within twenty minutes total reflex time, for 90 percent of all requests for non-emergency transports. This measure will utilize “travel time” rather than total reflex time as transports are generally scheduled in advance.

Performance Objective: Stop the escalation of a medical condition beyond the level of severity found upon arrival. Specifically, assess patients and prioritize care to minimize death and disability, intervene successfully in life-threatening emergencies, stabilize patients to prevent additional suffering, and provide basic or advanced life support, transporting as necessary.

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